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ABSTRACT

This study was conducted to describe and compare the content of pedagogical claims and supporting arguments. Subjects were 12 experienced teachers who participated in a year-long training program to prepare them to be Reading Recovery teachers. Teachers worked with children daily in 30-minute lessons and met in weekly seminar sessions with a group of peers for observation and subsequent discussion. Each teacher was engaged in a cycle of tutoring a child while being observed by the other 11 members of the group, observing others in the group teach, and critically analyzing each teaching session for an hour under the guidance of a teacher who raised questions about premises, grounds, backing, and warrants for arguments advanced during each critique. Results indicated that teachers appeared to have stereotypic models for problems linked to evasive steps designed to avoid or remedy problems. The most prevalent premises asserted by these teachers focused on the assessment of pupil comprehension and learning whether directly from a prior lesson or from the retention of prior learning. The resources around which teachers plan, the subject matter they teach, their knowledge of the subject matter, and the social and theoretical dimensions of their pedagogical knowledge influenced their interpretations and representations of subject matter, though not nearly as much as cues in the teaching situation itself. A form of meta-argument emerged in the final training session. The data indicated that practical reasoning can be taught and learned, although not necessarily through direct didactic methods. (Two tables of data are included, and 28 references are attached.) (MG)

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Stake that Claim:
The Content of Pedagogical Reasoning

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STAKE THAT CLAIM: THE CONTENT OF PEDAGOGICAL REASONING

Introduction

A growing body of scholarship describes the structure of pedagogical knowledge and reasoning (Fenstermacher, 1978; Green, 1971; Morine-Dershimer, 1987, 1988; Rentel, 1988; Rentel and Pinnell, 1987; Shulman, 1987) and argues that reasoning permeates teaching. The kind of reasoning involved is not formal conditional reasoning but, instead, is what Jarvis (1982) defined as practical reasoning. Practical reasoning is based upon abstract pragmatic rules of inference related to particular contexts, relationships, and inferential goals (Nisbett, Fong, Lehman, and Cheng, 1987; Rentel, 1988).

Disciplines have evolved their own characteristic forms of practical reasoning and argumentation (Toulmin, Rieke, and Janik, 1979). Science, law, business, and the arts have created traditions and forums for practical reasoning suited to the goals and purposes of argumentation in each field. In business, arguments are shaped by the need to determine a course of action designed to limit risks, maximize profits, and minimize losses. In law, argumentation is influenced by the need to establish which set of facts provides the best grounds for a verdict of guilt or innocence in a trial. In science, argumentation is framed to establish convincing and plausible explanations for natural anomalies. In art, practical arguments establish the authenticity and esthetic values of given works of art.

Research on teachers' practical knowledge (Elbaz, 1983) and their principles of practice (Conners, 1978; Marland, 1977) suggests that a substructure of practical reasoning underlies teaching. These studies demonstrated that teachers develop rules and principles of practice based on well-developed arguments and reasons.

Marland (1977), for example, using an interview technique involving stimulated recall, uncovered five principles that seem to guide and explain teachers' actions: (a) compensation, (b) power sharing, (c) strategic leniency, (d) progressive checking, and (e) suppressing emotions. Teachers gave reasons explaining how each principle is related to a desired pedagogical outcome. Each requires a judgment contingent on some form of practical argument. Conners (1978) replicated Marland's study, obtaining results that extended these principles and added new ones. The point here, however, is that both studies demonstrated that a chain of reasoning undergirds these principles.

Elbaz (1983) described teachers' practical knowledge as rules of practice, practice principles, and images dealing with curriculum, subject matter, instruction, milieu, and self. According to Elbaz, rules of practice are short, explicit statements describing how a teacher might act in typical teaching situations. They are drawn from experience, and they guide and rationalize actions. They are often accompanied by images of how teaching should look and feel. Most importantly, they are based on pragmatic arguments grounded in experience.

Those researchers, as well as others (Bussis, Chittenden and Amarel, 1976; Duffy, 1977; Janesick, 1977; Munby, 1983), argue that teachers construct highly individualistic theories and beliefs, grounded in a

variety of complex interpretations, explanations, and reasoning about practice. Teachers' decisions and actions are grounded in theory (Duffy, 1977; Janesick, 1977; Munby, 1983; Wiley and Eskilson, 1978), and the relationships between their theories and their classroom actions are extraordinarily complex (Bussis, Chittenden and Amarel, 1976; Duffy, 1977). In fact, teachers who may share the same belief system vary considerably from each other in their principles and actions. Together, these studies argue that teachers construct highly individualistic theories and beliefs arising from practical reasoning.

In an earlier study (Rentel, 1988; Rentel and Pinnell, 1987) we argued that reasoning plays an important part in teaching. While we did not describe or even attempt to describe the full range of reasoning employed by teachers, it was clear that there are unique qualities and dimensions to it. Unlike other professions where reasoning takes place in many kinds of public forums, teachers generally think alone when they plan and reflect upon their actions and teach largely without benefit of professional criticism from peers. Typically, they articulate their reasons in local forums and are influenced strongly by the ethos of local colleagues and the policies of local school districts.

The classroom itself is very complex and dynamic. Research has begun to show that much on-the-spot reasoning occurs during teaching. Teachers make numerous decisions during interactive teaching (Clarke and Peterson, 1986; Warner, 1987). Their actions are highly influenced by theories and belief systems as well as by problem sensing and avoidance (Mitchell and Marland, 1989), and pupil dispositional

assessment strategies (Yinger and Villar, 1986) Because of the constant need to act on the spot, the complexity of what they do, and the absence of explicit rules of practice, their actions appear to be more artful than thoughtful and the complexity of their thinking tends to be underrated or discounted.

However, when given an opportunity to examine pedagogical issues or problems in detail, teachers' conceptual systems are highly explicit and their actions are predicated on (a) complex practical arguments that evolve into highly reasoned principles of action, (b) simple principles that are based on such arguments, and (c) and not well understood or described professional norms. Though not all or, indeed even most teaching acts are solidly grounded in warranted belief, we have argued that clearly there are basic forms of reasoning underlying the majority of teachers' actions.

Can Reasoning Be Taught?

There is evidence (Nisbett, Fong, Lehman, and Cheng, 1987) that practical reasoning can be taught. The rules are not those of formal logic:

> ...Instead, the types of inferential rules that people use naturally and can be taught most easily are a family of pragmatic inferential rule systems that people induce in the context of solving recurrent everyday problems. These rule systems are abstract inasmuch as they can be used in a wide variety of content domains, but their use is confined to certain types of problem goals and particular types of relations between events (p. 625).

Nisbett and his colleagues studied the effects of training on the use of inferential rules in statistics, in causal schemas, and "contractual rules" underlying permission and obligation in social

settings. In one such experiment, Cheng and Holyoak (1985) trained subjects to solve straightforward conditional problems, first, without benefit of context, and, then, with context. Subjects were trained to solve simple conditional problems of the form, "if p, then q," then given problems to solve. For example, in a case about deplaning of airplane passengers, subjects were to indicate whether the conditional was violated in various instances of the following type: "If the form says 'entering' on one side, then the other side includes cholera among the list of diseases." Many subjects were unable to solve the problem correctly. When provided with a "permission" rationale--told that the form included diseases for which passengers had been inoculated--almost all solved the problem. Similar effects were obtained in studies where subjects generalized "the law of large numbers" (Fong, Krantz and Nisbett, 1986; Jepson, Krantz, and Nisbett, 1983; Nisbett, Krantz, Jepson, and Kunda, 1983). Nisbett et al. (1987) interpreted these results to mean that, while logical training by itself may not be generalizable, pragmatic rules that can be related to preexisting knowledge structures do generalize.

This conclusion is further supported by results obtained in a study of the effects of undergraduate courses in formal logic on students' ability to solve problems involving conditional or bi-conditional reasoning (Cheng, Oliver and Nisbett, 1986). No significant differences were observed between pre- and post-tests in students' ability to solve conditional and bi-conditional problems. On the other hand, Nisbett et al. (1987) reported the results of a pair of unpublished studies, one cross-sectional and the other longitudinal, on

the effects of graduate education in psychology, medicine, law, and chemistry on statistical reasoning, on methodological reasoning, and on conditional and bi-conditional reasoning. Assuming that psychology and medicine, both probabalistic sciences, would improve the ability to apply statistical and methodological rules, and assuming that both deal with varied causal patterns involving both necessity and sufficiency, differences were expected favoring psychology and medicine over chemistry (where necessary and deterministic causes are emphasized), and over law (where probability is not stressed). Because law does deal with contracts, no differences were expected among law, psychology, and medical students in the use of conditional and bi-conditional reasoning.

Initial differences in populations were insignificant, but after two years of training, effects favoring psychology and medicine were large and statistically significant for probabilistic and methodological reasoning. Expected results were obtained for conditionals and bi-conditionals. Psychology, law, and medical students improved significantly while chemistry students did not for statistical, methodological, or conditional reasoning. This study, done at the University of Michigan, was replicated at the University of California at Los Angeles for chemistry and psychology students and results were similar. Nisbett et al. concluded:

> Our work suggests that the formal discipline rule may well be correct in essence, but that it has misidentified the knowledge structures that underlie reasoning about everyday life events. There are abstract rules and these can be trained abstractly. The rules may not be those of formal logic, however, but instead may be pragmatic inferential rules having to do with particular types of

> relationships and inferential goals. These structures are more specific than logical rules, but they are abstract in that they are not bound to any content domain (p. 629).

The conclusion we want to underscore from the above body of work is that reasoning of a particular kind can be taught. In this paper, following Jarvis, Toulmin, Green, and Fenstermacher, we shall refer to this form of reasoning as practical reasoning. In making this claim we do not take a simplistic view of teaching as a didactic procedure. Rather, we consider "teaching" to encompass both direct and indirect approaches as well as creating settings where complex problem solving experiences can take place. We contend that one of the major purposes of the professional component of teacher education is create settings for teaching practical reasoning--what Shulman refers to as pedagogical reasoning.

Green (1971, 1976) has long taken the position that teaching entails a particular form of practical reasoning. One of the major tasks of teacher education, he contends, is to prepare teachers to frame practical arguments undergirding their actions. By assisting teachers to formulate the practical arguments supporting instructional practices, and helping them amass evidence that bears on relevant premises, a basis is provided for the teacher to become aware of his or her own practices and to judge the potential outcomes that may follow from a particular action.

Pedagogical Reasoning

Shulman has suggested that there are both general patterns of pedagogical reasoning and patterns related to specific contents. This kind of practical reasoning can be construed as the pedagogical reasoning that underlies the formulation of arguments supporting instructional

practice, the accumulation of evidence that bears upon relevant instructional premises, and the basis for judging outcomes and consequences that follow upon teaching acts. Our earlier findings suggest that the pedagogical reasoning underlying reading instruction can be improved significantly (Rentel and Pinnell, 1987). None of this work, however, has attempted to describe the specific content of practical arguments nor how these contents are altered or evolve as reasoning improves. The goal of the study presented below was to describe and compare the content of pedagogical claims and supporting arguments. The content categories that were identified in the corpus of arguments we studied were very similar to those proposed by Shulman (1987) but quite different in several key dimensions.

Procedures

Subjects were 12 experienced teachers who participated in a year-long training program to prepare them to be Reading Recovery teachers, who provide intensive, one-to-one daily tutoring for young children having difficulty in reading. For the entire training year, teachers work with children daily in 30-minute lessons and meet in weekly seminar sessions with a group of peers during which extensive use is made of a one-way glass for observation and subsequent discussion. Each teacher is engaged in a cycle of tutoring a child while being observed by the other 11 members of the group, observing others in the group teach, and critically analyzing each teaching session for an hour under the guidance of a teacher leader who raised questions about premises, grounds, backing, and warrants for arguments advanced during each critique.

The context for the Reading Recovery seminar provided a well-defined and less complex teaching context than a live classroom. One teacher worked with one child through a sequence of reading and writing activities while observers saw and heard everything in lessons that they discussed afterwards.

During observation and discussion sessions, a leader invited group members to critique each lesson. A group leader invited group members to make "claims," and advance arguments about these lessons even if they had not fully thought through their ideas. This process forced participants to make their ideas explicit by expressing them verbally so that the claims could be examined and refined, that is, subjected to the reasoning process. When claims were made, the leader asked participants for evidence to support or counter those statements.

From their observations, participants selected the specific instances of behavior, or from their reflection selected evidence and theory, that supported their claims. A discussion leader requested and sometimes provided or pointed out evidence, or gave feedback as to whether the evidence selected by participants was relevant to the claims made.

The inservice course was designed to require participants to justify their decisions by relating general background theory to specific claims about individual children, or to support claims by grounding them in other evidence such as research or previous class presentations on theoretical material. This "backing" required group members to move from specific instances of behavior in the cases they were examining toward more general theoretical statements about their work.

Throughout the process, participants were urged to qualify their arguments and to generate claims that were tentative in nature because: (1) teaching decisions are based on hypotheses regarding underlying mental processes that cannot be directly observed; and (2) decisions during the observation/discussion session are based on half-hour observations of teaching rather than on long "case studies." We assumed that the required tentativeness removed some of the risk of the situation both for the observers and for the demonstrating teachers; thus, presumably, participants were more willing to make claims and to examine them in group discussion. The stakes were not high; claims were offered for examination as reasoned attempts to solve a problem. A single individual did not have to provide grounds or evidence for any given claim; the reasoning process was a group effort. While some participants challenged and questioned, others provided additional grounds for the claim under consideration. We assumed that participants play varied roles from session to session.

Group members were instructed to withhold judgment and restrict conclusions to the observed evidence, and to avoid judgments and conclusions based on unsupported assumptions. The leader would sometimes say, "we can't be sure" or "let's look for more evidence." When conflicts arose, participants were expected to obtain more evidence or to argue from research and theory.

Participants were urged to reflect aloud, making claims and then supporting those claims by observed evidence and background information. They negotiated, argued, and discussed, reaching conclusions that were the result, presumably, of complex problem-solving and reasoning processes.

Tutoring and critique sessions were audio taped. Audio tapes were transcribed. Transcriptions were segmented into turns--utterances by a single speaker bounded by the utterances of other speakers. Each speaker occupied a turn slot. Two trained judges classified the statements in each turn as a claim, grounds for a claim, and/or backing for a claim (.94). Arguments were then segmented into propositions. Propositions were assigned to one of Shulman's pedagogical content knowledge categories or to one of six additional categories derived from arguments advanced in the critiques. These categories and brief definitions follow:

Pedagogical Content Knowledge (Shulman, 1987):

Comprehension- understanding purposes, structures, and relationships internal and external to a reading pedagogy.
Preparation- interpreting subject matter; developing curricular purposes and categories.
Representation- depicting content through demonstrations, explanations, analogies, examples, metaphors, etc.
Adaptation- modification of content or instruction to the requirements of culture, social class, age, gender, ability, aptitudes, interests, motivation, preconceptions, misconceptions, language, and learning difficulties.
Instruction (Pedagogical Strategy)- forms of presentation, interaction, grouping arrangements, management, questioning, discipline, procedure, or method.
Pupil Evaluation- assessing pupil understanding and performance.
Teacher Evaluation- assessing teacher understanding and performance.
Reflection- reviewing and reconstructing teacher/pupil performance and grounding explanations in evidence.

Additional Categories (Rentel and Pinnell, 1987):

Problem Identification- detecting and defining the attributes of anomalous pupil/teacher performances.
Problem Representation- attributing cause and defining relationships among problem attributes.
Textual Representation: identifying and defining linguistic structures, relationships, and functions.
Theory- defining and explaining reading.
Professional Norms- ethics, values, mores, and institutional assumptions about teaching.

Propositions were classified and frequencies were tallied for each category. Frequencies were compared between two training sessions--the initial and final session six months later--using log-linear procedures (see Tables 1 and 2 for category frequencies).

Findings and Conclusions

The null hypothesis of homogeniety of proportional response over categories of content between training sessions was rejected, $X^2(13) = 124.24$, $p < .000$. Follow-up, two-dimensional, saturated-model comparisons (see Table 1) indicated significant final-session increases in the number of propositions dealing with representation, pupil evaluation, problem representation, text representation, and theory. Significant final-session decreases were observed in the number of propositions dealing with comprehension, preparation, selection, teacher evaluation, and reflection. No differences were observed between initial and final sessions in the number of propositions classified as adaptation, problem solving, problem identification, and professional norms.

The content of arguments during the Fall session dealt with selecting texts at appropriate grade levels, determining pupils' motivational and ability levels, and adapting pedagogical style to pupil psychological states. The initial discussion focused on the instructional alternatives available to the teacher, particularly the selection and use of texts. Group members made suggestions to the demonstrating teachers; for example:

> Becky: That new book you were reading where every page started with "and..." -- whe can't do that. You'd want it to be a whole sentence on each page.
>
> Marcy: That structure of the continuous sentence is just too much for her.

The leader used examples from the observation to illustrate alternatives available to the teacher.

> Leader: We also thought you might be able to move her up to level 3. The Running Record book was unusual in that the pattern changed as well as the sentence not being on the same page but she showed enough control of the easy reading she was doing in the new book. Be very careful selecting the book.

During the initial session, participants spent little time attempting to achieve an adequate representation of a problem; instead, they appeared to have a problem identification schema with "readability level of text" being one of a few high-probability alternatives to account for pupil's reading difficulties. In the first session, they identified almost all problems as text selection problems--texts too difficult for the child. Arguments about the nature of problems were resolved quickly and directly by characterizing them as "the readability of the text is too difficult" or "the pupil's lack of strategies." During the final session, arguments about appropriate text selection almost disappeared and problems were identified only after considerable anaylsis of how the problem might be described and represented.

Nearly half of the arguments during the final session set forth claims about pupil learning strategies, pupil misconceptions, and pupils' adaptive responses to specific text structures, functions, and relationships. The significant increase in <u>pupil evaluations</u> in the final session was a function of more discourse about the interaction between pupils and specific chunks of text. References to or analysis of pupil-text interaction were employed as grounds for pedagogical claims

centering on how content should be represented rather than on selecting texts at designated reading levels. During the final session, arguments shifted from analyzing pupil psychological states to analyzing how pupils were representing the linguistic structure of texts. In turn, arguments about pedagogy dealt with how best to represent these structures for pupils.

> N: Make sure we're watching to see what strategies she might be using.
>
> B: Monitoring, self-correcting...
>
> N: What was her self-correction?
>
> B: "Me too," She started to say "we are," and then she changed it to "me too." So, she was monitoring. She was aware of an error.
>
> J: There's enough information in the picture. She's cross checking meaning with visual information.
>
> B: And, she's using a little more expression and a little more pausing...

These results fit rather well with other descriptions of teacher thinking (Marland and Osborne, 1988; Mitchell and Marland, 1989). Teachers appear to have stereotypic models of problems linked to evasive steps designed to avoid or remedy problems. These models or schema include information about context, problem features that trigger the identification of the problem, and a repertoire of responses to problems. Teachers appear to have identifiable frames, models, or schema through which the fast-paced action of classroom life is processed and intepreted (Doyle, 1977; Mitchell and Marland, 1989). Even in circumstances with ample time for reflection and planning, these experience-shaped schema

play a significant role in teacher thinking. Training designed to increase the likelihood of teachers engaging in reasoned analysis of instructional premises appears to broaden and deepen these schema and to produce fuller and more carefully grounded arguments about problems and pedagogical solutions to them.

As was the case in Morine-Dershimer's (1988) findings, the most prevalent premises asserted by these teachers focused on the assessment of pupil comprehension and learning either directly from a prior lesson or from the retention of prior learning. In their final-session practical arguments, teachers examined means-end relationships associated with their reading recovery training. There was a balance between premises about pupil comprehension and pupil engagement in instructional activities. Similarly, as with Morine-Dershimer's subjects, these teachers asserted claims about subject matter in roughly the same proportion as claims about getting puils actively involved in learning.

It also appears that the resources around which teachers plan, the subject matter they teach, their knowledge of subject matter, and the social and theoretical dimensions of their pedagogical knowledge influence their interpretations and representations of subject matter (Mitchell and Marland, 1989; Rentel, 1988) though not nearly as much as cues in the teaching situation itself (Yinger and Villar, 1986).

Finally, a form of meta-argument--claims about pedagogical reasoning--emerged in the final training session. Initial claims categorized as reflection focused on self-adequacy and efficacy while reflection in the final session dealt with the adequacy of pedagogical strategies, the

reasoning supporting them, and the quality of pedagogical arguments advanced by members of the group.

The data suggest that practical reasoning can be taught and learned although not necessarily through direct didactic methods. Given the opportunity to relate pragmatic rules to preexisting knowledge structures through argument and discussion surrounding everyday problem solving, teachers can improve their ability to reason soundly and thereby improve their teaching. As indicated above, sound reasoning requires an adequate foundation of facts, principles, practical intuitions, and rather complex theories and action schema. Improving the grounds and backing for teaching--the ability to explain and rationalize teaching actions on the basis of warranted belief, sound evidence, and adequate backing--presumably leads to the kinds of pupil improvements typically associated with reading recovery. In educating good teachers, research on teacher thinking argues that staking claims may be far more important than making claims about good methodology and sound technique.

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Table 1

Frequency of Argument Type by Level of Training

Category	Initial Session	Final Session	X^2	p (13)
Comprehension	5	0	10.64	< .003
Preparation	1	0	5.47	< .003
Representation	16	45	6.81	< .003
Selection	49	3	11.92	< .003
Adaptation	7	6	.89	> .05
Pedagogical Strategy	69	56	.56	> .05
Evaluation (Teacher)	69	37	1.96	< .05
Evaluation (Pupil)	101	163	4.06	< .003
Reflection	43	13	4.24	< .003
Problem Identification	31	20	.42	> .05
Problem Representation	10	29	7.41	< .003
Text Representation	34	43	2.82	< .01
Theory	2	18	11.86	< .003
Professional Norms	2	1	.98	> .05

Table 2

Frequency of Turns, Claims, and Propositions by Training Level

Observation	Initial Session	Final Session
Turns	263	253
Claims	380	370
Propositions	441	434